

PRODUCTION HEIGHTS OF MUONS DETERMINED WITH THE MUON TRACKING DETECTOR OF THE KASCDAE EXPERIMENT

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Since last year the Muon Tracking Detector, located in an underground tunnel north of the centre of the KASCADE experiment, is taking data with its complete setup of 16 detector telescopes. This detector allows to study the muon production height. Due to different characteristics in shower development of light (e.g. p) and heavy (e.g. Fe) primary particles the muon production height is sensitive to the masses of the primary particles.

Measured data as well as simulated showers induced by proton and iron primaries, in each case simulated with CORSIKA coupled with two different interaction models (QGSJET, NEXUS), have been used to reconstruct the muon production height by means of triangulation. Production heights were investigated in different ranges of zenith angle and shower energy. The method of triangulation is based on radial and tangential angles defined by the direction of the shower and the direction of the muons. As an estimation of the displacement of the muon from the shower axis the tangential angle is used. The accuracy of these two angles is influenced by the reconstruction accuracy of the shower direction and of the muon tracks. The combined angle resolution of the KASCADE Array and the Muon Tracking Detector improves with increasing shower energies. Due to multiple scattering of muons travelling in the atmosphere a correction to very large muon production heights is necessary. The correction was derived by investigation of distributions of muon production heights obtained from the simulations.